

I claim:

1. A catheter, comprising:

an outer shaft comprising distal and proximal ends;

an inner shaft comprising distal and proximal ends, the inner shaft being disposed concentrically inside the outer shaft;

a rigid inner member comprising distal and proximal ends, the rigid inner member comprising an interior portion disposed inside the inner shaft and defining a lumen, the rigid inner member being fixed to the inner shaft; and

wherein the outer shaft is slidable relative to the inner shaft from a first position in which the distal end of the inner shaft is remote from the distal end of the outer shaft, to a second position in which the distal end of the inner shaft is adjacent to the distal end of the outer shaft.

2. The apparatus of claim 1, the rigid inner member further comprising an exterior portion protruding beyond the distal end of the inner shaft.

3. The apparatus of claim 2, further comprising a stepped exterior tube that comprises a wide diameter end and a sheath, the wide diameter end being fixed to the distal end of the outer shaft and fully enclosing the exterior portion of the rigid inner member in the second position.

4. The apparatus of claim 1, further comprising gripping portions disposed on the inner shaft and outer shaft.

5. The apparatus of claim 1, the sheath further comprising distal and proximal ends, and being directly movable by movement of the outer shaft from the first position to the second position.
6. The apparatus of claim 5, further comprising a catheter having a distal end and a proximal end, the proximal end of the catheter being fixed to the rigid inner member, the distal end of the catheter being disposed proximate the distal end of the sheath.
7. The apparatus of claim 6, wherein the distal end of the catheter is covered by the distal end of the sheath in the first position, and the distal end of the catheter is uncovered by the distal end of the sheath in the second position.
8. The apparatus of claim 7, further comprising a stent disposed on the distal end of the catheter.
9. The apparatus of claim 8, wherein the stent is deployed when the distal end of the sheath uncovers the distal end of the catheter by movement of the outer shaft from the first position to the second position.
10. The apparatus of claim 1, further comprising a valve to flush air from the sheath.

11. A catheter, comprising:

an outer shaft comprising distal and proximal ends;

an inner shaft comprising distal and proximal ends, wherein the inner shaft is disposed concentrically inside the outer shaft, wherein the outer shaft is slidable relative to the inner shaft between a first position in which the distal end of the inner shaft is remote from the distal end of the outer shaft and a second position in which the distal end of the inner shaft is adjacent to the distal end of the outer shaft;

a rigid inner member having distal and proximal ends and an interior portion disposed inside the inner shaft and defining a lumen within the inner shaft, the rigid inner member being fixed at its proximal end to the proximal end of the inner shaft, the rigid inner member further comprising an exterior portion protruding beyond the distal end of the inner shaft; and

a stepped exterior tube comprising a wide diameter end and a sheath, the wide diameter end being fixed to the distal end of the outer shaft and fully enclosing the exterior portion of the rigid inner member in the second position.

12. The apparatus of claim 11, further comprising gripping portions disposed on the inner shaft and outer shaft.

13. The apparatus of claim 11, the sheath further comprising distal and proximal ends, and being directly movable by movement of the outer shaft from the first position to the second position.

14. The apparatus of claim 13, further comprising a catheter having a distal end and a proximal end, the proximal end of the catheter being fixed to the rigid inner member, the distal end of the catheter being disposed proximate the distal end of the sheath.

15. The apparatus of claim 14, wherein the distal end of the catheter is covered by the distal end of the sheath in the first position, and the distal end of the catheter is uncovered by the distal end of the sheath in the second position.

16. The apparatus of claim 15, further comprising a stent disposed on the distal end of the catheter.

17. The apparatus of claim 16, wherein the stent is deployed when the distal end of the sheath uncovers the distal end of the catheter by movement of the outer shaft from the first position to the second position.

18. The apparatus of claim 11, further comprising a valve to flush air from the sheath.

19. A catheter, comprising:

an outer shaft comprising distal and proximal ends;

an inner shaft comprising distal and proximal ends, wherein the inner shaft is disposed concentrically inside the outer shaft, wherein the outer shaft is slidable relative to the inner shaft between a first position in which the distal end of the inner shaft is remote from the distal end of the outer shaft and a second position in which the distal end of the inner shaft is adjacent to the distal end of the outer shaft;

a rigid inner member having distal and proximal ends and an interior portion disposed inside the inner shaft and defining a lumen within the inner shaft, the rigid inner member being fixed at its proximal end to the proximal end of the inner shaft, the rigid inner member further comprising an exterior portion protruding beyond the distal end of the inner shaft;

a stepped exterior tube, comprising a wide diameter end and a sheath, the wide diameter end being fixed to the distal end of the outer shaft and fully enclosing the exterior portion of the rigid inner member in the second position;

the sheath having distal and proximal ends, and being directly movable by movement of the outer shaft from the first position to the second position;

a catheter, comprising a distal end and a proximal end, the proximal end of the catheter being fixed to the rigid inner member, the distal end of the catheter being disposed proximate the distal end of the sheath, the distal end of the catheter being covered by the distal end of the sheath in the first position, and the distal end of the catheter being uncovered by the distal end of the sheath in the second position; and

a stent disposed on the distal end of the catheter, wherein the stent is deployed when the distal end of the sheath uncovers the distal end of the catheter by movement of the outer shaft from the first position to the second position.

20. A method of deploying a catheter, comprising:

providing an outer shaft comprising distal and proximal ends;

providing an inner shaft comprising distal and proximal ends, disposed concentrically inside the outer shaft;

providing a rigid inner member comprising distal and proximal ends, the rigid inner member further comprising an interior portion disposed inside the inner shaft and defining a lumen within the inner shaft, the rigid inner member being fixed at its proximal end to the proximal end of the inner shaft;

providing a catheter comprising a proximal end and a distal end, the proximal end of the catheter being fixed to the rigid inner shaft;

providing a sheath comprising a proximal end and a distal end, the proximal end being fixedly connected to the distal end of the outer shaft, the distal end being disposed proximate the distal end of the catheter; and

uncovering the distal end of the catheter from the distal end of the sheath by moving the outer shaft from a first position in which the proximal end of the outer shaft is remote from the proximal end of the inner shaft to a second position in which the proximal end of the outer shaft is adjacent the proximal end of the inner shaft.